

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F21-R-42

Name: Lake Byron

County: Beadle

Legal Description: T113N- R61W- Sec. 22-23, 25-26, 28, 34-35

Location from nearest town: 11 miles north, 3 miles east, 1½ north of Huron, SD

Dates of present survey: July 30 - August 1, 2009

Dates of last survey: July 30 - August 1, 2007

Primary Game Species	Other Species
Walleye	Northern Pike
Yellow Perch	Gizzard Shad
Black Crappie	Black Bullhead
	Common Carp
	Bigmouth Buffalo
	White Sucker
	Freshwater Drum
	Shortnose Gar
	Yellow Bullhead
	Shorthead Redhorse
	Green Sunfish
	Orange-spotted Sunfish

PHYSICAL DATA

Surface area when full: 1,805 acres

Watershed area: 115,350 acres

Maximum depth when full: 10 feet

Mean depth when full: 7 feet

Lake elevation observed during the survey: 2 feet low

Ordinary high water mark elevation: 1,250.0

Date set: March, 2001

Outlet elevation: 1,248.1

Date set: March, 2001

Contour map available? Yes

Date prepared: 1970

Beneficial use classification(s): (6) warmwater semipermanent fish propagation and irrigation (7) immersion recreation, (8) limited-contact recreation, (9) fish and wildlife propagation and stock watering.

Introduction

Lake Byron is a natural lake formed by receding glacial ice. Indians originally named it Big Toad Lake because, from a distance, the large trees surrounding the lake looked like big toads. In 1866, an Indian trader named Byron Pay was camped by the lake and carved the initials of his Indian nickname "Bye" and the date on a tree. After that, local residents started calling the lake "Lake Byron".

The size and depth of the lake varies greatly from year to year. Annual water fluctuations can vary from plus one foot to minus three feet. The lake was dry enough to

farm from 1933-1935. Fish kills are common, especially during low water years (Table 10).

Ownership of Lake and Adjacent Lakeshore Property

Lake Byron is listed as meandered public water in the State of South Dakota Listing of Meandered Lakes. The meandered portion of the lake contains about 1,450 acres. The South Dakota Department of Game, Fish and Parks (GFP) owns and maintains property on the northwest, northeast, and south sides of the lake. The remaining lakeshore property is privately owned and heavily developed.

Fishing Access

The South Lake Access Area contains a boat ramp with a dock and a public toilet. The North Lake Access Area contains a boat ramp with a dock, public toilet, picnic tables, and offers primitive camping. All public areas on the lake have shorelines suitable for shore fishing.

Field Observations of Water Quality and Aquatic Vegetation

The water in Lake Byron was stained brown during the survey with a Secchi depth measurement of 46 cm (18 in). Some scattered beds of sago pondweed (*Potamogeton pectinatus*), cattails (*Typha spp.*), and bulrushes (*Scirpus spp.*) were observed.

BIOLOGICAL DATA

Methods:

Lake Byron was sampled on July 30 - August 1, 2009 with three overnight gill-net sets and ten overnight trap-net sets. The trap nets are constructed with 19-mm-bar-mesh ($\frac{3}{4}$ in) netting, 0.9 m high x 1.5 m wide (3 ft high x 5 ft wide) frames and 18.3 m (60 ft) long leads. The gill nets are 45.7 m long x 1.8 m deep (150 ft long x 6 ft deep) with one 7.6 m (25 ft) panel each of 13, 19, 25, 32, 38 and 51-mm-bar-mesh ($\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$, and 2 in) monofilament netting. Sampling locations are displayed in Figure 5.

Results and Discussion:

Gill Net Catch

Gizzard shad (70.3%), walleye (12.9%), bigmouth buffalo (5.2%), black bullhead (3.4%) comprised 91.8% of the gill net sample (Table 1). Other species sampled included yellow perch, shortnose gar, black crappie, white sucker, common carp, freshwater drum, channel catfish, and river carpsucker. Many of the gizzard shad captured in the gill nets were age-0 fish (Table 2).

Table 1. Total catch from three overnight gill net sets at Lake Byron, Beadle County, July 30 - August 1, 2009.

Species	Number	Percent	CPUE ¹	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Gizzard Shad	268	70.3	89.3	+57.4	9.7	--	--	--
Walleye	49	12.9	16.3	+7.8	27.3	43	14	91
Bigmouth Buffalo	20	5.2	6.7	+4.8	17.4	86	0	95
Black Bullhead	13	3.4	4.3	+1.1	57.2	31	0	96
Yellow Perch	8	2.1	2.7	+0.9	14.8	--	--	--
Shortnose Gar	6	1.6	2.0	+1.3	0.1	--	--	--
Black Crappie	5	1.3	1.7	+0.9	0.7	--	--	--
White Sucker	5	1.3	1.7	+0.9	0.6	--	--	--
Common Carp	4	1.0	1.3	+0.4	42.9	--	--	--
Freshwater Drum	1	0.3	0.3	+0.4	5.7	--	--	--
Channel Catfish	1	0.3	0.3	+0.4	0.0	--	--	--
River Carpsucker	1	0.3	0.3	+0.4	0.0	--	--	--

* 5 years (1999, 2001, 2003, 2005, 2007)

Table 2. Catch per unit effort by length category for various fish species captured with gill nets in Lake Byron, July 30 - August 1, 2009.

Species	Substock	Stock	S-Q	Q-P	P+	All sizes	80% C.I.
Gizzard Shad	89.0	--	--	--	--	89.0	+57.4
Walleye	7.0	9.3	5.3	2.7	1.3	16.3	+7.8
Bigmouth Buffalo	4.3	2.3	0.3	2.0	--	6.7	+4.8
Black Bullhead	--	4.3	3.0	1.3	--	4.3	+1.1
Yellow Perch	--	2.7	2.0	0.7	--	2.7	+0.9
Shortnose Gar*	--	--	--	--	--	2.0	+1.3
Black Crappie	--	1.7	--	1.3	0.3	1.7	+0.9
White Sucker	--	1.7	--	0.3	1.3	1.7	+0.9
Common Carp	0.3	1.0	1.0	--	--	1.3	+0.4
Freshwater Drum	--	0.3	--	--	0.3	0.3	+0.4
Channel Catfish	--	0.3	0.3	--	--	0.3	+0.4
River Carpsucker	--	0.3	--	0.3	--	0.3	+0.4

*No length categories established. Length categories can be found in Appendix A.

Trap Net Catch

Freshwater drum (23.2%) were the most abundant species sampled in the trap nets followed by common carp (17.9%), black crappie (15.3%), and black bullhead (14.8%) (Table 3). Thirteen other species were also sampled.

¹ See Appendix A for definitions of CPUE, PSD, and mean Wr.

Table 3. Total catch from ten overnight trap net sets at Lake Byron, Beadle County, July 30 - August 1, 2009.

Species	Number	Percent	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Crappie	224	42.8	22.4	<u>+4.9</u>	5.6	47	3	122
Common Carp	82	15.7	8.2	<u>+2.5</u>	43.8	87	40	92
Black Bullhead	60	11.5	6.0	<u>+3.1</u>	183.6	34	0	99
Bigmouth Buffalo	54	10.3	5.4	<u>+3.3</u>	7.7	83	8	98
White Sucker	45	8.6	4.5	<u>+1.5</u>	7.5	100	48	98
Northern Pike	15	2.9	1.5	<u>+0.7</u>	1.3	93	27	87
Shortnose Gar	11	2.1	1.1	<u>+0.6</u>	1.5	--	--	--
Walleye	9	1.7	0.9	<u>+0.6</u>	3.3	--	--	--
Channel Catfish	6	1.1	0.6	<u>+0.6</u>	0.1	--	--	--
Yellow Perch	5	1.0	0.5	<u>+0.4</u>	3.7	--	--	--
Freshwater Drum	4	0.8	0.4	<u>+0.3</u>	4.7	--	--	--
Yellow Bullhead	3	0.6	0.3	<u>+0.2</u>	0.2	--	--	--
River Carpsucker	2	0.4	0.2	<u>+0.3</u>	0.0	--	--	--
Gizzard Shad	1	0.2	0.1	<u>+0.1</u>	1.5	--	--	--
O. S. Sunfish	1	0.2	0.1	<u>+0.1</u>	0.4	--	--	--
Bluegill	1	0.2	0.1	<u>+0.1</u>	0.0	--	--	--

* 5 years (1999, 2001, 2003, 2005, 2007)

Table 4. Catch per unit effort by length category for various fish species captured with trap nets in Lake Byron July 30 - August 1, 2009.

Species	Substock	Stock	S-Q	Q-P	P+	All sizes	80% C.I.
Black Crappie	0.8	21.6	11.5	9.5	0.6	22.4	<u>+4.9</u>
Common Carp	--	8.2	1.1	3.8	3.3	8.2	<u>+2.5</u>
Black Bullhead	0.2	5.8	3.8	2.0	--	6.0	<u>+3.1</u>
Bigmouth Buffalo	0.1	5.3	0.9	4.0	0.4	5.4	<u>+3.3</u>
White Sucker	--	4.5	--	1.8	2.7	4.5	<u>+1.5</u>
Northern Pike	--	1.5	0.1	1.0	0.4	1.5	<u>+0.7</u>
Shortnose Gar*	--	--	--	--	--	1.1	<u>+0.6</u>
Walleye	0.2	0.7	0.6	--	0.1	0.9	<u>+0.6</u>
Channel Catfish	0.1	0.5	0.5	--	--	0.6	<u>+0.6</u>
Yellow Perch	--	0.5	0.4	--	0.1	0.5	<u>+0.4</u>
Freshwater Drum	--	0.4	0.1	0.2	0.1	0.4	<u>+0.3</u>
Yellow Bullhead	--	0.3	--	0.1	0.2	0.3	<u>+0.2</u>
River Carpsucker	--	0.2	--	0.2	--	0.2	<u>+0.3</u>
Gizzard Shad	0.1	--	--	--	--	0.1	<u>+0.1</u>
O. S. Sunfish*	--	--	--	--	--	0.1	<u>+0.1</u>
Bluegill	--	0.1	0.1	--	--	0.1	<u>+0.1</u>

*No length categories established. Length categories can be found in Appendix A.

Walleye

Management objective: Maintain a walleye fishery with a gill-net CPUE of at least 15 and a growth rate of 35 cm (14 in) by age-3.

Walleye gill-net CPUE increased in 2009 and exceeded the management objective (Table 5). The fish sampled ranged in length from 22 to 58 cm (8.7 – 22.8 inches) (Figure 1) and were in good condition with a mean Wr of 91.

Walleye stocking was suspended for several years due to low water and because the 2004 stocking produced a good year class (Table 9). Maintaining the Byron walleye population relies heavily on stocking as shown by the gap in the length frequency graph (Figure 1) from 2004 and 2008. There was no stocking and few walleyes were naturally produced during this time period.

Table 5. Walleye gill-net CPUE, PSD, RSD-P and mean Wr for Lake Byron, Beadle County, 2001-2009.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean*
CPUE	11.0		42.5		68.0		4.3		16.3	27.3
PSD	8		18		26		92		43	42
RSD-P	0		4		0		0		14	3
Mean Wr	88		98		99		98		91	95

*5 years (1999, 2001, 2003, 2005, 2007)

Yellow Perch

Management objective: Maintain a yellow perch fishery with a gill-net CPUE of at least 25.

Yellow perch CPUE has been declining since 2003 due to inconsistent natural recruitment (Table 6 and Figure 2). Since black bullhead abundance has followed a similar trend, the factors influencing the recruitment of both species may be related. Some small yellow perch were sampled (Figure 2) but not in the numbers expected with increased water levels.

Table 6. Yellow perch gill-net CPUE, PSD, RSD-P and mean Wr for Lake Byron, Beadle County, 2001-2009.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean*
CPUE	12.7		27.5		19.0		3.3		2.7	14.8
PSD	39		98		53		100		--	75
RSD-P	7		65		45		50		--	36
Mean Wr	102		105		104		99		--	102

*5 years (1999, 2001, 2003, 2005, 2007)

Black Crappie

Management objective: Maintain a black crappie fishery with a trap-net CPUE of at least 20.

Black crappie CPUE increased again in 2009 making them the most abundant game fish in the lake (Table 7). The crappies sampled ranged in length from 12 to 31 cm (4.7 – 12.2 in) (Figure 3) and they were in excellent condition with a Wr of 122.

Table 7. Black crappie trap-net CPUE, PSD, RSD-P and mean Wr for Lake Byron, Beadle County, 2001-2009.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean*
CPUE	6.2		4.1		1.5		13.5		22.4	5.6
PSD	--		61		50		79		47	69
RSD-P	--		21		17		9		3	16
Mean Wr	--		124		117		122		122	121

*5 years (1999, 2001, 2003, 2005, 2007)

Black Bullhead

Management objective: Maintain a black bullhead fishery with a trap-net CPUE of no more than 100.

Black bullhead CPUE has dropped dramatically since 2003 and is well within the management objective (Table 7). A large percentage (34%) of the sampled fish exceeded 23 cm (9 in) (Figure 4) which is a desirable size for anglers.

Table 8. Black bullhead trap-net CPUE, PSD, RSD-P, and Mean Wr for Lake Byron, Beadle County, 2001-2009.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	Mean*
CPUE	55.0		240.0		11.4		13.0		6.0	183.6
PSD	63		53		33		43		34	43
RSD-P	6		5		10		0		0	4
Mean Wr	87		98		101		101		99	96

*5 years (1999, 2001, 2003, 2005, 2007)

All Species

Gizzard shad, absent before 2007, produced another year class since the last survey. Shortnose gar numbers increased while common carp, black bullhead, and bigmouth buffalo populations declined.

Table 9. Gill-net (GN) and trap-net (TN) CPUE for all fish species sampled in Lake Byron, Beadle County, 2001-2009.

Species	2001	2002	2003	2004	2005	2006	2007	2008	2009
SNG (GN)	--		--		--		0.3		2.0
SNG (TN)	0.4		1.6		0.5		4.4		1.1
GOE (GN)	--		--		--		--		--
GOE (TN)	0.1		--		--		--		--
GZD (GN)	--		--		--		48.7		89.3
GZD (TN)	--		--		--		7.6		0.1
COC (GN)	0.2		--		209.5		5.0		1.3
COC (TN)	1.2		2.6		195.8		15.8		8.2
RIC (GN)	--		--		--		--		0.3
RIC (TN)	--		--		--		0.1		0.2
WHS (GN)	9.5		8.0		4.5		--		1.7
WHS (TN)	6.3		14.8		9.6		2.0		4.5
BIB (GN)	2.0		6.0		38.0		28.3		6.7
BIB (TN)	1.6		1.8		27.4		6.2		5.4
SHR (GN)	--		--		--		--		--
SHR (TN)	0.5		0.6		0.5		0.1		--
BLB (GN)	14.7		46.0		1.0		16.0		4.3
BLB (TN)	55.0		240.0		11.4		13.0		6.0
YEB (GN)	--		--		--		--		--
YEB (TN)	0.4		--		0.4		--		0.3
CCF (GN)	--		--		--		--		0.3
CCF (TN)	--		0.1		--		0.5		0.6
NOP (GN)	0.2		--		1.0		0.7		--
NOP (TN)	2.1		0.9		--		1.5		1.5
GSF (GN)	--		--		--		--		--
GSF (TN)	--		--		1.6		0.1		--
OSF (GN)	--		0.5		--		--		--
OSF (TN)	--		--		0.6		1.3		0.1
HYB (GN)	--		--		--		--		--
HYB (TN)	--		--		--		0.1		--
WHC (GN)	--		--		--		--		--
WHC (TN)	--		0.1		--		--		--
BLC (GN)	0.2		0.5		0.5		1.7		1.7
BLC (TN)	6.2		4.1		1.5		13.5		22.4
YEP (GN)	12.7		27.5		19.0		3.3		2.7
YEP (TN)	0.3		1.4		15.0		0.4		0.5
WAE (GN)	11.0		42.5		68.0		4.3		16.3
WAE (TN)	4.6		4.9		4.5		1.1		0.9
FWD (GN)	1.0		2.5		9.5		13.7		0.3
FWD (TN)	1.8		0.5		0.3		20.4		0.4

SNG (Shortnose Gar), GOE (Goldeye), GZD (Gizzard Shad), COC (Common Carp), RIC (River Carpsucker), WHS (White Sucker), BIB (Bigmouth Buffalo), SHR (Shorthead Redhorse), BLB (Black Bullhead), YEB (Yellow Bullhead), CCF (Channel Catfish), NOP (Northern Pike), GSF (Green Sunfish), OSF (Orangespotted Sunfish), HYB (Hybrid Sunfish), WHC (White Crappie), BLC (Black Crappie), YEP (Yellow Perch), WAE (Walleye), FWD (Freshwater Drum).

MANAGEMENT RECOMMENDATIONS

1. Stock walleye and yellow perch as needed to accomplish management objectives or following fish kills to reestablish the fishery.
2. Encourage commercial fishing for rough fish and black bullheads.
3. Investigate the feasibility of installing handicapped-accessible fishing docks on property owned by GFP.
4. Investigate the feasibility of installing rough fish barriers on the inlet and outlet to limit rough fish migration.

Table 10. Stocking record for Lake Byron, Beadle County, 1995-2009.

Year	Number	Species	Size
1995	1,354	Black Crappie	Fingerling
	23	Largemouth Bass	Adult
	3,700,000	Walleye	Fry
1996	2,625,000	Walleye	Fry
	105	Walleye	Lrg. Fingerling
	175,661	Yellow Perch	Fingerling
1997	900,000	Walleye	Fry
1999	10,500	Yellow Perch	Adult
2000	190,315	Walleye	Fingerling
	28,575	Yellow Perch	Juvenile
2001	1,895,000	Walleye	Fry
2004	1,900,000	Walleye	Fry
2008	2,000,000	Walleye	Fry

Table 11. History of known fish kills for Lake Byron, Beadle County.

When	Type of Kill	Severity*
1959-60	Winterkill	Heavy
1960-61	Winterkill	Light
1968-69	Winterkill	Heavy
1985-86	Winterkill	Heavy
1993-94	Winterkill	Moderate
1996-97	Winterkill	Moderate
1998	Summerkill	Light
2007-08	Winterkill	Light

*Total – no live fish found

Heavy – large numbers of dead fish, some kill-resistant fish alive

Moderate – moderate numbers of dead fish, some kill-resistant and kill-prone fish alive

Light – just a few kill-prone fish found dead

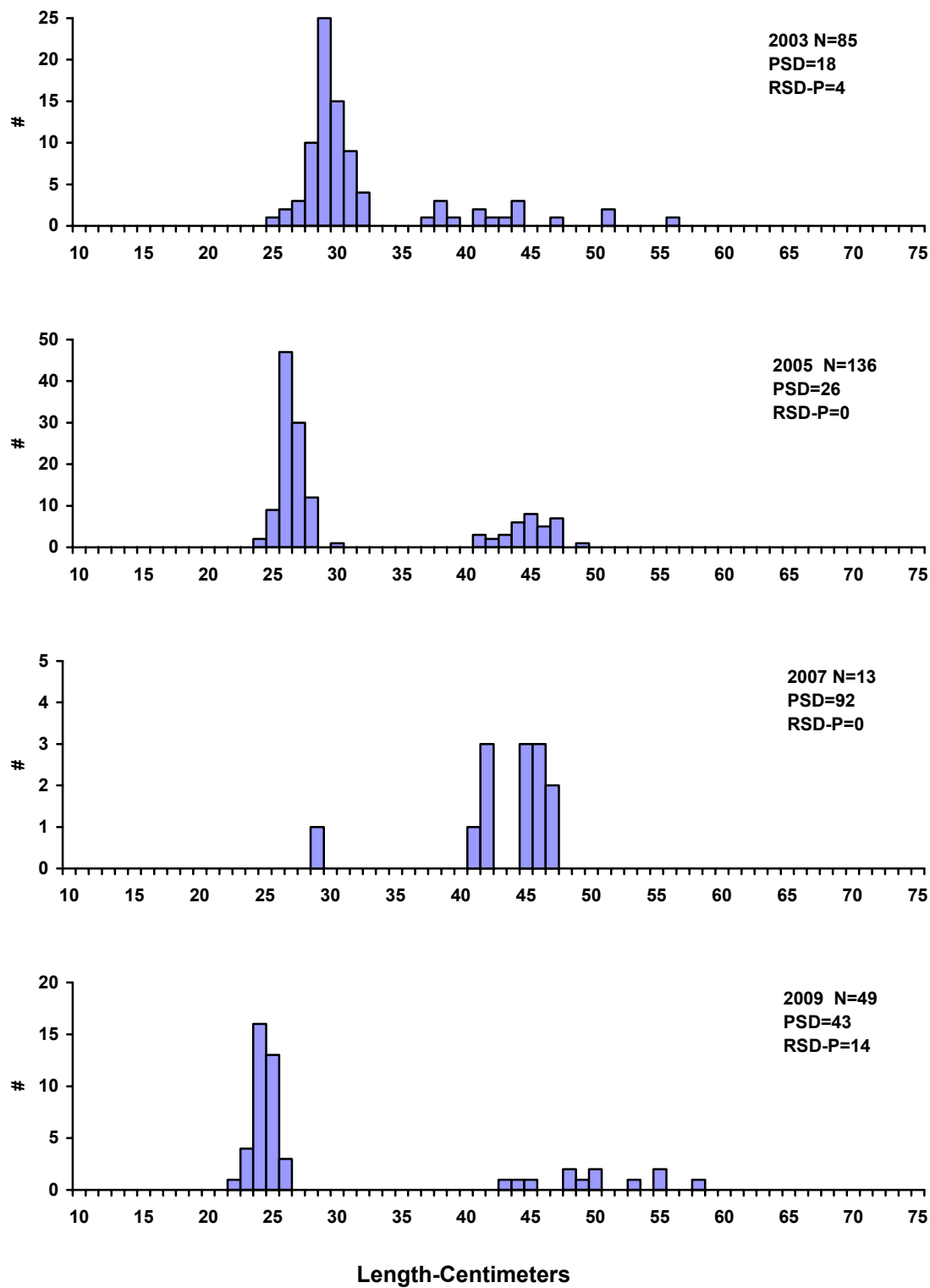


Figure 1. Length frequency histograms for walleye sampled with gill nets in Lake Byron, Beadle County, 2003, 2005, 2007, and 2009.

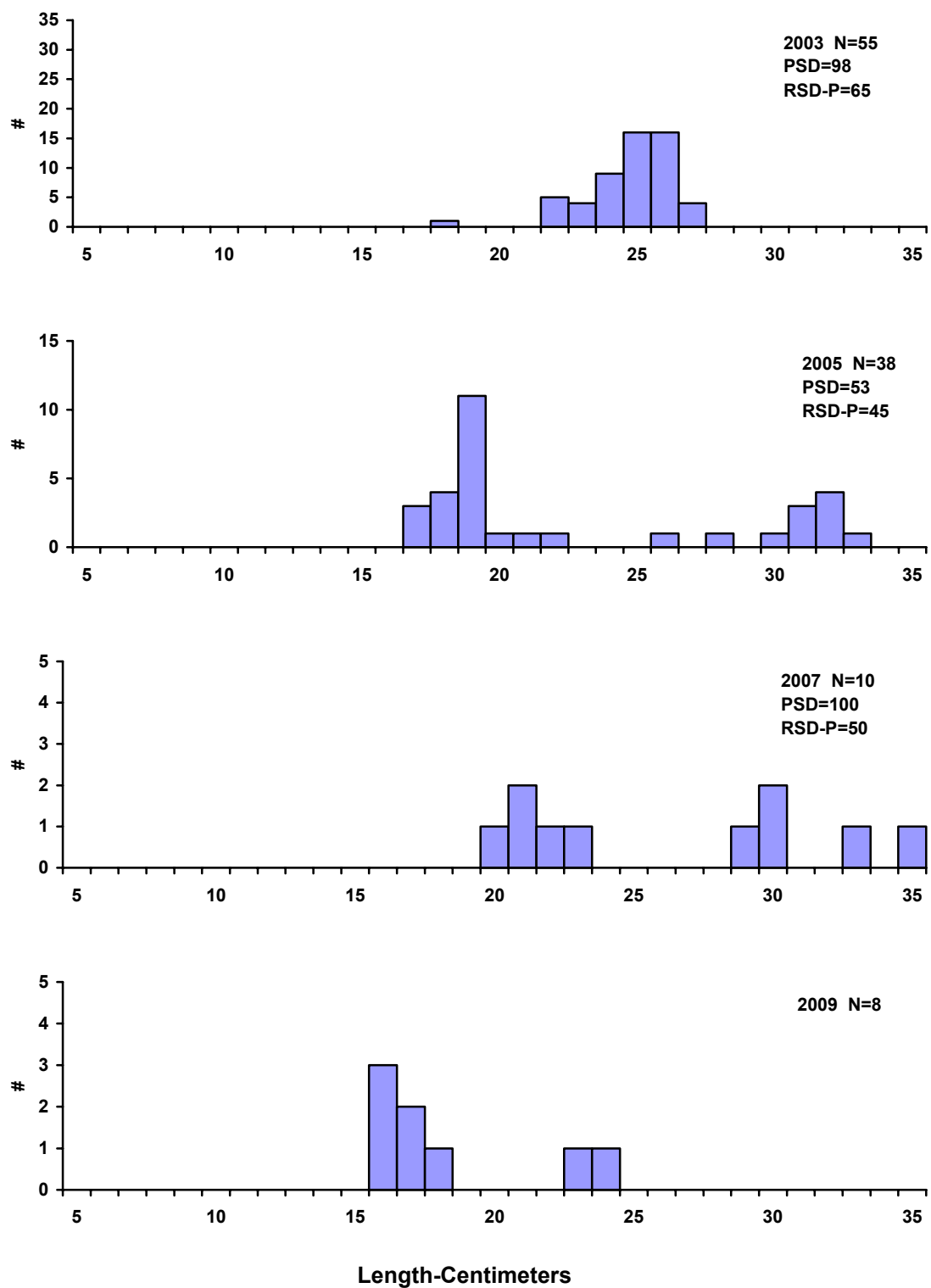


Figure 2. Length frequency histograms for yellow perch sampled with gill nets in Lake Byron, Beadle County, 2003, 2005, 2007, and 2009.

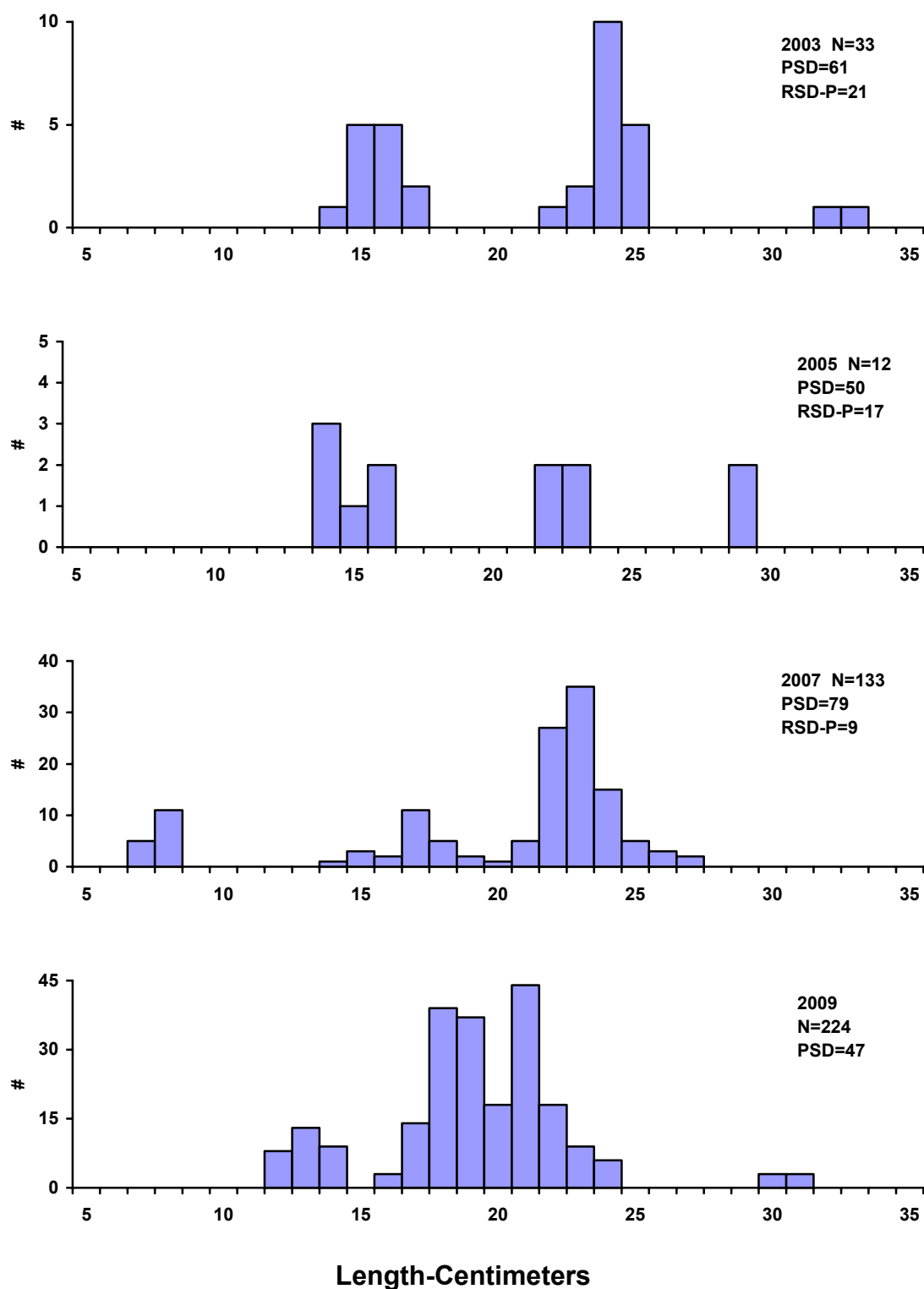


Figure 3. Length frequency histograms for black crappie sampled with trap nets in Lake Byron, Beadle County, 2003, 2005, 2007, and 2009.

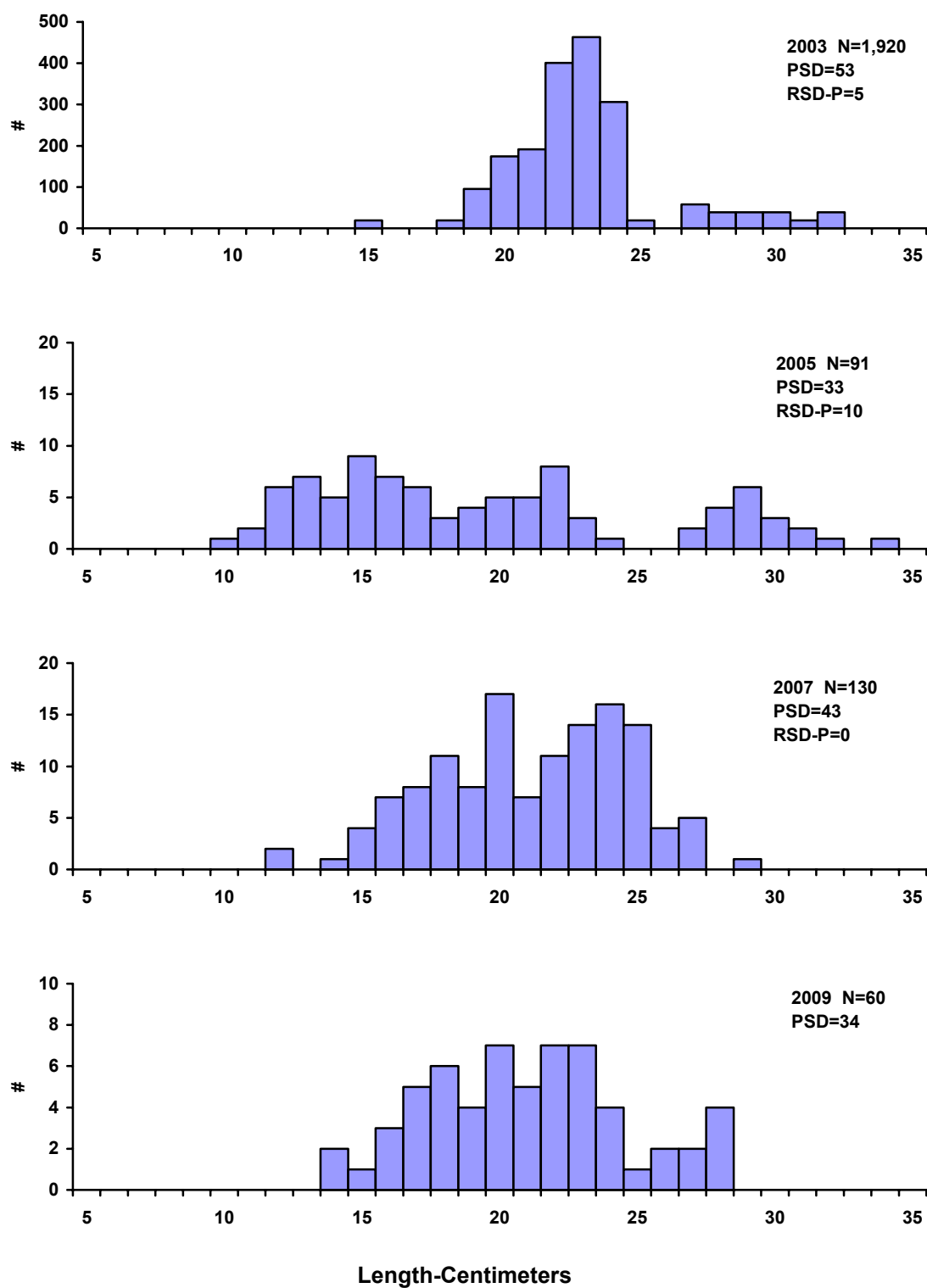


Figure 4. Length frequency histograms for black bullheads sampled with trap nets in Lake Byron, Beadle County, 2003, 2005, 2007, and 2009.

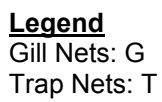


Figure 5. Sampling locations on Lake Byron, Beadle County, 2009.

Appendix A. A brief explanation of catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr).

Catch Per Unit Effort (CPUE) is the catch of animals in numbers or in weight taken by a defined period of effort. Can refer to trap-net nights of effort, gill-net nights of effort, catch per hour of electrofishing, etc.

Proportional Stock Density (PSD) is calculated by the following formula:

$$\text{PSD} = \frac{\text{Number of fish} > \text{quality length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

Relative Stock Density (RSD-P) is calculated by the following formula:

$$\text{RSD-P} = \frac{\text{Number of fish} > \text{preferred length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

PSD and RSD-P are unitless and usually calculated to the nearest whole digit.

Size categories for selected species found in Region 3 lake surveys, in centimeters.

Species	Stock	Quality	Preferred	Memorable	Trophy
Walleye	25	38	51	63	76
Sauger	20	30	38	51	63
Yellow perch	13	20	25	30	38
Black crappie	13	20	25	30	38
White crappie	13	20	25	30	38
Bluegill	8	15	20	25	30
Largemouth bass	20	30	38	51	63
Smallmouth bass	18	28	35	43	51
Northern pike	35	53	71	86	112
Channel catfish	28	41	61	71	91
Black bullhead	15	23	30	38	46
Common carp	28	41	53	66	84
Bigmouth buffalo	28	41	53	66	84
Smallmouth buffalo	28	41	53	66	84

For most fish, 30-60 or 40-70 are typical objective ranges for “balanced” populations. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

Relative weight (Wr) is a condition index that quantifies fish condition (i.e., how much does a fish weigh for its length). A Wr range of 90-100 is a typical objective for most fish species. When mean Wr values are well below 100 for a size group, problems may exist in food and feeding relationships. When mean Wr values are well above 100 for a size group, fish may not be making the best use of available prey.